Claims

1. A protein

a) that has the ability to bind specifically to the ED_b-fibronectin domains;

b) that is expressed or activated specifically in endothelial cells;

c) that is expressed or activated specifically in the stromal cells of a tumor;

d) that is expressed or activated specifically in tumor cells;

e) whose binding to the ED_b-fibronectin domains is inhibited by a polypeptide; and

f) that has an apparent molecular weight of 120-130 kDa for the light chain and 150-160 kDa for the heavy chain, determined by SDS-polyacrylamide gel electrophoresis.

2. A protein according to claim 1

a) that has the ability to bind specifically to the ED_b-fibronectin domains, whereby the binding region is characterized by at least one sequence that is selected from the group that comprises SEQ ID NOS: 1-3;

b) that is expressed or activated specifically in endothelial cells;

c) that is expressed or activated specifically in stromal cells of a tumor;

d) that is expressed or activated specifically in tumor cells;

e) whose binding to the ED_b-fibronectin domains is inhibited by a polypeptide that comprises a sequence that is selected from the group that comprises SEQ ID NOS: 1-3; and

f) that has an apparent molecular weight of 120-130 kDa for the light chain and 150-160 kDa for the heavy chain, determined by SDS-polyacrylamide gel electrophoresis.

3. A protein, according to claims 1 to 2,

a) that has the ability to bind specifically to the ED_b-fibronectin domains and that comprises the $\alpha 2 \beta 1$ chain of the integrin;

b) that is expressed or activated specifically in endothelial cells;

c) that is expressed or activated specifically in stromal cells of a tumor;

d) that is expressed or activated specifically in tumor cells;

e) whose binding to the ED_b-fibronectin domains is inhibited by a polypeptide and that comprises the α chain of the integrin; and

f) that has an apparent molecular weight of 120-130 kDa for the light chain and 150-160 kDa for the heavy chain, determined by SDS-polyacrylamide gel electrophoresis.

4. Protein according to claims 1 to 3, characterized in that the endothelial cells are proliferating endothelial cells.

5. Protein whose specific binding to the ED_b-fibronectin domains mediates the adhesion of endothelial cells, tumor-stromal cells and tumor cells.

6. Protein whose specific binding to the ED_b-fibronectin domains mediates the adhesion of endothelial cells, tumor-stromal cells and tumor cells, whereby the binding region is characterized by at least one sequence that is selected from the group that comprises SEQ ID NOS: 1-3.

7. Protein according to claim 6, wherein the binding region comprises the α2ß1 chain of the integrin.

8. Protein whose specific binding to the ED_b-fibronectin domains induces the proliferation of endothelial cells.

9. Protein whose specific binding to the ED_b-fibronectin domains induces the proliferation of endothelial cells, whereby the binding region is characterized by at least one sequence that is selected from the group that comprises SEQ ID NOS: 1-3.

10. Protein according to claim 9, wherein the binding region comprises the α2ß1 chain of the integrin.

11. Protein whose specific binding to the ED_b-fibronectin domains induces the proliferation, migration and differentiation of endothelial cells in a collagen matrix.

12. Protein whose specific binding to the ED_b-fibronectin domains induces the proliferation, migration and differentiation of endothelial cells in a collagen matrix, whereby the binding

region is characterized by at least one sequence that is selected from the group that comprises SEQ ID NOS: 1-3.

13. Protein according to claim 12, wherein the binding region comprises the α2ß1 chain of the integrin.

14. Protein that binds to the ED_b-fibronectin domains and induces specific signal transduction pathways, whereby at least one gene is induced that codes for a protein that is selected from the group that comprises

-- Focal adhesion kinase,

-- CD6 ligand (ALCAM),

-- the α chain of the vitronectin receptor,

-- the integrated alpha 8 subunit, and

-- a/the precursor(s) for follistatin-related protein.

15. Protein that binds to the ED_b-fibronectin domains and induces specific signal transduction pathways, whereby at least one gene is induced that codes for a protein that is selected from the group that comprises

-- Focal adhesion kinase,

-- CD6 ligand (ALCAM),

-- the α chain of the vitronectin receptor,

-- the integrated alpha 8 subunit, and

-- a/the precursor(s) for follistatin-related protein,

and whereby the binding region is characterized by at least one sequence that is selected from the group that comprises SEQ ID NOS: 1-3.

16. Protein according to claim 15, wherein the binding region comprises the α2ß1 chain of the integrin.

17. Antibody that is able to bind to a protein according to one of claims 1-10.

18. Antibody that is able to bind to a protein that comprises an amino acid sequence that is selected from the group that comprises SEQ ID NOS: 1-4.

19. Antibody according to one of claims 17-18 that is able to inhibit effects that are specific to the ED_b-fibronectin domains.

20. Antibody according to one of claims 17-18, whereby the binding and inhibition are carried out in vitro and/or in vivo.

21. Antibody according to one of claims 17-20, wherein it is monoclonal or recombinant.

22. Antibody, according to one of claims 17-21, wherein it is an scFv fragment.

23. Cell that expresses a protein according to one of claims 1-10.

24. Cell that expresses an antibody according to one of claims 17-22.

25. Phage that expresses an antibody according to one of claims 17-22.

26. Process for screening compounds that bind to a receptor of the ED_b-fibronectin domains, whereby the process comprises:

Comparison of a response of cells in the presence of one or more of these compounds with the control response of said cells in the absence of these compounds, whereby the cells

express a protein according to one of claims 1-10 or

comprise a nucleic acid that codes for this protein, and

whereby the response or the control response is mediated by a receptor of the ED_b-fibronectin domains.

27. Process according to claim 26, whereby the response or the control response comprises the adherence of cells to surfaces that are coated with the ED_b-fibronectin domains or portions thereof.

28. Process according to one of claims 26-27, wherein a binding region of the ED_b-fibronectin domains comprises sequences SEQ ID NOS: 1-4 or portions thereof.

29. Process according to claim 26, wherein the response or the control response comprises the proliferation of cells on surfaces that are coated with the ED_b-fibronectin domains or portions thereof.

30. Process according to claim 26, wherein the response or the control response comprises the proliferation, migration and differentiation of endothelial cells in a collagen matrix that is mixed with the ED_b-fibronectin domains or portions thereof.

31. Process according to one of claims 26-30, whereby the compounds are selected from the group that comprises antibodies, artificial antibodies, antibody fragments, peptides, low-molecular compounds, aptamers and Spiegelmers.

32. Process according to claim 31, wherein the antibodies are recombinant antibodies.

33. Process according to claim 31, wherein the antibodies are selected from the group that comprises scFv and fragments thereof.

34. Process for screening compounds that bind to the ED_b-fibronectin domains, whereby the process comprises:

a) Bringing cells into contact with a fixed concentration of a protein that comprises the ED_b-fibronectin domains or a protein with one of the sequences that are represented in SEQ ID NOS: 1-4, in the presence of different concentrations of one or more of the compounds; and

b) Determination of differences in the response of cells to the protein that comprises the ED_b-fibronectin domains or a protein with one of the sequences that are represented in SEQ ID NOS: 1-4, in the presence of the compounds in comparison to the control response of cells to the protein that comprises the ED_b-fibronectin domains or a protein with one of the sequences that are represented in SEQ ID NOS: 1-4, in the absence of these compounds, whereby

the cells express a protein according to one of claims 1-10 or

comprise a nucleic acid that codes for this protein,

and whereby the response or the control response is mediated by a receptor of the ED_b-fibronectin domains.

35. Process according to claim 34, whereby the response or the control response comprises the adherence of the cells to surfaces that are coated with the ED_b-fibronectin domains or portions thereof.

36. Process according to claim 34, wherein the response or the control response comprises the proliferation of cells on surfaces that are coated with the ED_b-fibronectin domains or portions thereof.

37. Process according to claim 34, wherein the response or the control response comprises the proliferation, migration and differentiation of endothelial cells in a collagen matrix, which is mixed with the ED_b-fibronectin domains or portions thereof.

38. Process according to one of claims 34-37, whereby the compounds are selected from the group that comprises antibodies, artificial antibodies, antibody fragments, peptides, low-molecular substances, aptamers and Spiegelmers.

39. Use of a nucleic acid that codes for a protein that comprises a sequence that is selected from the group that comprises SEQ ID NOS: 1-4 for screening compounds that bind to a receptor of the ED_b-fibronectin domains or the ED_b-fibronectin domains.

40. Use of a protein according to one of claims 1-10 or an antibody according to one of claims 17-22 for screening compounds that bind to a receptor of the ED_b-fibronectin domains or the ED_b-fibronectin domains.

41. Use of a cell according to one of claims 23-24 for screening compounds that bind to a receptor of the ED_b-fibronectin domains or the ED_b-fibronectin domains.

42. Use of a nucleic acid that codes for a protein that comprises a sequence that is selected from the group that

comprises SEQ ID NOS: 1-4 to develop antibodies or scFv-fusion proteins for diagnostic or therapeutic purposes.

43. Use of a protein according to one of claims 1-10 to develop antibodies or scFv-fusion proteins for diagnostic or therapeutic purposes.

44. Use of a cell according to one of claims 23-24 to develop antibodies or scFv-fusion proteins for diagnostic or therapeutic purposes.

45. Use of a phage according to claim 25 to develop antibodies or scFv fusion proteins for diagnostic or therapeutic purposes.

46. Use of a protein that comprises a sequence that is selected from the group that comprises SEQ ID NOS: 1-4 for a pro-angiogenic therapy.

47. Use of a protein that comprises a sequence that is selected from the group that comprises SEQ ID NOS: 1-4 for diagnostic purposes.

48. Use of a protein that comprises a sequence that is selected from the group that comprises SEQ ID NOS: 1-4 in gene therapy.

49. Use of a protein that comprises a sequence that is selected from the group that comprises SEQ ID NOS: 1-4 to coat surfaces that bind to the endothelial cells.

50. Use according to claim 49, wherein the coating is carried out in vitro or in vivo.

51. Use of a protein that comprises a sequence that is selected from the group that comprises SEQ ID NOS: 1-4 in cell cultures.

52. Use of a protein that comprises a sequence that is selected from the group that comprises SEQ ID NOS: 1-4 together with at least one transplant.

53. Use according to claim 52, wherein the transplant is selected from the group that comprises the vessel(s), skin, cornea, kidneys, liver, bone marrow, heart, lungs, bones, thymus gland, small intestine, pancreas, other internal organs as well as portions and cells thereof.

54. Use of a protein that comprises a sequence that is selected from the group that comprises SEQ ID NOS: 1-4 together with at least one implant.

55. Use according to claim 54, wherein the implant is selected from the group that comprises lung implants, artificial pacemakers, artificial cardiac valves, vascular implants, endoprostheses, screws, splints, plates, wires, pins, rods, artificial joints, breast implants, artificial cranial plates, false teeth, fillings and bridges.